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ORIGINAL ARTICLES.

THE VALUE OF WEAK LENSES IN MODERATE ERRORS OF REFRACTION.[1]

BY ALBERT E. BULSON, JR., B.S., M.D., FORT WAYNE, IND.,

OCULIST AND AURIST FOR ST. VINCENT'S ORPHAN ASYLUM AND THE ALLEN COUNTY ORPHAN ASYLUM; PROFESSOR OF LARYNGOLOGY AND RHINOLOGY IN THE FORT WAYNE COLLEGE OF MEDICINE, FORT WAYNE, INDIANA.

WITHIN the limits of this paper it is not my purpose nor would it be possible to discuss all of the phases of the question which I have chosen as my title, which must necessarily be subject to limitation. Conflicting ideas regarding the necessity or practicability of correcting moderate errors of refraction, as recently expressed by some of the leading ophthalmologists in letters to various medical publications, and my own decided opinions on the subject, leads me to bring the question before this meeting for consideration.

In no branch of the ophthalmologist's work is there more careful consideration and keen judgment demanded than in the correction of errors of refraction, and yet we not infrequently find an ophthalmologist who frankly admits that he

[1] Read at the Second Annual Meeting of the Western Ophthalmological, Otological, Laryngological and Rhinological Association, held in St. Louis, April 8-9, 1897.

dislikes work of this character, probably because of the patience required in many cases, and therefore delegates the work to an assistant, or, unless the error be conspicuous, looks farther for the cause of the symptoms which bring the patient for attention.

Little wonder then that opticians, so-called "ophthalmic refractionists," and "doctors of refraction" vigorously ply their unnatural calling and cry lustily for professional recognition when by accident or chance a highly neurotic individual, a former patient of ophthalmologist Jones or Smith, secures needed relief through them by the adjustment of a weak spherical or cylindrical lens.

A professional friend, an ophthalmologist of considerable prominence and no little experience, once said to me that he very rarely corrected an error of refraction of less than one dioptre, and never one under one-half dioptre, arguing that such slight errors do not produce sufficient disturbance to warrant correction, and that if diligent search be made other causes may be discovered that are responsible for the symptoms for which the patient seeks relief. To my surprise I find that this opinion is one held by many ophthalmologists, the paramount idea being that the muscles of accommodation should do a certain amount of work and that to interfere with this natural function is neither scientific nor rational.

While I am willing to admit that Nature should be encouraged to do its intended work, and that many other causes besides error of refraction may be responsible for eye symptoms, I am free to say that we come far short of obtaining satisfactory results by ignoring some of the most inconspicuous refractive errors, and in following hard and fast rules in the prescribing of glasses.

Our captious critic may say that an emmetropic eye is a rarity, and that therefore if it is scientific to correct all errors of refraction we will find it necessary to put a pair of glasses upon nine out of every ten people, and thus add weight to the comment of the late Bill Nye that we are becoming a "spectacled nation." I answer that the progress of civilization, with its attending dissipations in the use of the eyes under unfavorable conditions, is responsible for many of our eye troubles, and, as occupation and environment,—which in the majority of cases it is not within our power to alter,—play such an im-

portant part in the development of eye troubles, the larger percentage of ametropes would not only be benefitted but would abort graver troubles by even the temporary use of correcting lenses.

It is taken for granted that the ophthalmologist to whom eye sufferers appeal is not only a man of keen judgment and an unusual amount of patience, but one endowed with a feeling for humanity and scientific truth, and who places the patient's health and comfort above all other considerations. Such a man can not be accused of prescribing superfluous glasses, nor of giving lenses "having nothing but a mythical value" if he choose to prescribe what are ordinarily termed weak lenses, which an extended experience has shown him to be of the utmost benefit in a certain class of cases which is not insignificant in point of number.

"Eye-strain" is a term loosely applied, but ordinarily signifies an error of refraction that is attended by more or less direct or indirect irritation, producing any of the symptoms from inconvenience and annoyance to pain and disease. Sometimes it takes but a slight departure from emmetropia to produce reflex irritations and even serious disturbance in vision, while at other times a very large error may be tolerated for years with apparently no inconvenience or discomfort, this difference being essentially due to the occupation, health and requirement of the individual.

A certain amount of accommodative power usually remains in reserve, which, through the efforts of ill-health or extreme taxation of sight, may decline, only to be restored by removing the predisposing causes. No inconsiderable judgment may be required to determine exactly the course to be pursued, but in nine times out of ten the results will be all the better for having assisted in restoring the accommodative power by temporarily relieving the over-taxed muscles.

Noyes says that anomalies of refraction lie at the root of 50 per cent. or more of all the diseases of the eye, and he lays down the general rule that a most important point in the treatment of eye diseases is to restore the eye to a condition of emmetropia by suitable glasses. The truth of this assertion is attested by every ophthalmologist of considerable experience; for who has not seen a recurring marginal blepharitis, conjunctival irritation or congestion entirely disappear under the

influence of correctly adjusted glasses, the lenses perhaps even belonging to the class said to have but "mythical value?"

By far the larger percentage of people who consult us with decline of accommodation can not be said to be in ill health, but rather engaged in occupations which demand unusual taxation of the eyesight. Perhaps but moderate symptoms of asthenopia, conjunctival irritation, or reflex disturbances directly attributed to the eye, bring them to the ophthalmologist. Vision may be approximately $^{20}/_{XX}$, and under the influence of a mydriatic a lens of but one-half or even a quarter diopter accepted. It does very well to prescribe rest and tonic treatment but these cases must have other relief, for they usually occur in a class of individuals who can neither afford the time nor understand the necessity of recovering the lost muscular tone,—which gives reserve accommodation,—by cessation of employment. In all seriousness how can anyone consider a lens of "mythical value" which will not only relieve one of this class of sufferers but enable him to continue his avocation for months and even years without further annoyance?

I have tabulated 100 recent cases in which either spherical or cylindrical lenses of less than one-half diopter have been prescribed with highly satisfactory results. Among these cases are draughtsmen, engravers, decorative painters, typesetters and others demanding the highest acuity of vision, while not a few occur among stenographers, seamstresses, musicians, students, and others largely depending upon eyesight for the satisfactory performance of their work.

It has perhaps been truthfully said that along with other advancements of the age we are crowding our children in the schools. Be that as it may every year brings a larger percentage of school children under the observation of the ophthalmologist for relief from eye troubles which are invariably associated with eye-strain. Some of these cases of eye trouble are predisposed by ill health, others by neurotic temperament, while others are directly and alone due to extreme taxation of the eye-sight as a result of prolonged hours of study, oftentimes under the most unfavorable conditions as regards light. Presuming that the school work must and will be continued, which is generally the case, something besides tonics, hygienic regulations and rest must be prescribed, and in the majority

of cases correctly adjusted lenses is the principal thing that will not only give relief but enable the pupil to satisfactorily finish the school-year. Are we not giving the patient the best treatment by correcting these errors, be they even less than one-half diopter, when an abundance of evidence goes to show that the results are highly satisfactory? The value of weak spherical or cylindrical lenses is best attested by those who use them, and in my own practice the verdict is very strongly in their favor, and no more grateful patients are to be found than those among students and school-children who perhaps have suffered inconvenience and discomfort for months before discovering the cause of the trouble.

Not every error of refraction demands correction by properly adjusted glasses any more than every weak ocular muscle demands a tenotomy, for every case must be carefully studied and due discrimination used. Health, temperament, occupation and environment must play an important part in the determination of the character of treatment to be instituted, and in estimating the value of lenses in any given case we must take into consideration the requirements of the patient. Thus, a person following an avocation which demands considerable active exercise, either in or out of doors, will seldom, if ever, be benefitted by correction of a moderate error of refraction, as this class of individuals are usually in good health, and the eyes being not unduly taxed the reserve power of accommodation is maintained. The same may be said of anyone leading a sedentary occupation which does not call fore more than ordinary use of the eyes. But, on the other hand, those individuals whose avocations require prolonged use of the eyes, or the highest acuity of vision, will eventually find even a moderate refractive error the immediate cause of inconvenience and discomfort. If the individual be suffering from impairment of general health, or is of a nervous temperament, the symptoms will not only be more aggravated but a less amount of ametropia is required to produce trouble. Thus in the case of a professional man of neurotic tendency, who has to all appearances enjoyed excellent health for years, an astigmatic error of but one-quarter diopter, under atropia, produced asthenopic symptoms of an annoying character which prevented prolonged eye work. Under full correction the patient has no discomfort,

and several attempts to abandon the glasses have ended in failure.

Numerous cases of this character might be cited as evidence to prove the value of weak lenses in moderate errors of refraction, and from experience in these cases only am I able to arrive at conclusions satisfactory to my own mind.

For my own part I prefer to examine the greater percentage of my refractive cases under the influence of a mydriatic, using homatropine except in those cases in which spasm of accommodation or other conditions demand atropia. In many instances but a part of the full correction is prescribed, due allowance being given for recovery of accommodative power through such assistance. In many cases, and this is especially true in the more moderate errors of refraction, the glasses are prescribed for temporary use only, or until the patient is free from prolonged eye-work. Students more particularly belong to this class.

The limitations of the use of weak lenses will therefore depend upon:

1. OCCUPATION.—Close application to any work demanding high acuity of vision tends to exhaust the reserve accommodative power and bring on direct or indirect symptoms of eye-strain, and but moderate refractive errors are necessary in some instances to produce trouble. Engravers, draughtsmen, decorative painters seamstresses, etc., are examples.

2. TEMPERAMENT.—The nervous individual is more susceptible to the influence of slight irregularities in vision than the phlegmatic. Many seamstresses, lady stenographers, china decorators, etc., belong to this class.

3. ENVIRONMENT.—Individuals following occupations that demand excessive use of the eyes in poorly lighted rooms—as inside office work—or who work wholly by artificial light, or work about objects which give much reflection are particularly apt to feel the influence of moderate accommodative errors. To this class belong certain book-keepers, newspaper men, type-setters, and students.

4. HEALTH.—Any impairment of health generally has its debilitating effect upon the eye-muscles and hence many convalescents or semi-invalids, even with but moderate errors of refraction, in attempting to pass the time by reading, soon discover symptoms of "eye-strain" which in many instances may

be relieved by properly adjusted glasses. Consumptives, victims of spinal lesions, and others of similar constitutional debilities come under this division.

In conclusion I have to say that there is not the slightest question in my mind as to the value of weak lenses in many cases of moderate errors of refraction, and while no definite rules can be formulated to govern the ophthalmologist in prescribing glasses I am convinced that he can not obtain the best results in all cases if he omits weak lenses from his means at hand for the relief of certain forms of eye-trouble directly or indirectly due to moderate refractive errors.

DISCUSSION.

DR. J. ELLIS JENNINGS.—The paper read by Dr. Bulson presents a question which is often a puzzling one. There are certain cases which seem to be benefited by the correcting of, say, half a diopter. But we must ask ourselves: are there not other points which we must take into consideration? Is the child at school sitting in a correct position? Or, is it studying too much? Because we know that even normal eyes, if subjected to too much work, will show irritation. Can we not often trace the difficulty to the child's course of study or the position in which the child sits at its desk; can we not by some method put the child's eyes at ease without putting on a pair of glasses? I do not think it is necessary in all these cases, where there is a quarter or half diopter defect, to use glasses. I had a case this morning that will illustrate one point. A young man, aged 21 years, has been wearing a pair of glasses for two years; he had got them down town at one of the optical stores and he said he had, till lately, experienced considerable relief by using this pair of glasses; that before he got them his eyes were red and he was having considerable difficulty with his eyes. However, recently when he had done considerable work, his eyes began to hurt him again. I examined the glasses he had worn for two years and they were about $-\,{}^{1}/_{12}$ D. cylindrical. I then examined his eyes under homatropine and found the correction he needed was + 0.5 D. with + 0.75 D. c., ax. 90°. Now how do you imagine that pair of $-\,{}^{1}/_{12}$ D. gave him relief for two years. Don't you think there was something else at the bottom of the trouble,

that possibly he did not work as hard, or took better care of his eyes? So I think we must take all these questions into consideration before we put on a pair of a quarter diopter cylindrical or half a diopter spherical glasses on a child that comes into our office.

DR. DAYTON.—I do not understand Dr. Jennings' idea; I do not exactly get the drift of it. Certainly Dr. Bulson does not mean that in a case which does not demand a + 0.50 D. or a + 0.75 D., we should put on a weak cylinder. But he means that if there is an error of refraction, if it even is no greater than perhaps 0.25 D., it ought to be corrected, and in my practice of the last 16 years I have been in the habit of correcting every error of refraction, even if it was only 0.25 D. I can recall to my mind one case in particular which passed from oculist to oculist, a lady of highly nervous temperament who had received no benefit from all the treatment that had been given; she had no glasses, none had been given her because the error of refraction, under homatropine, was only 0.25 D. c., ax. 80° and 100°. There was a slight conjunctivitis, scarcely enough to cause such symptoms and nervous manifestations as she complained of. I corrected the refraction—gave her a 0.25 D. c., at the axis mentioned, of 80° and 100°—and the result was perfect. She complained no longer of her troubles. There were no muscle insufficiencies, and as a fact this case was relieved by these weak cylindrical glasses. There was no mind-impression, no hypnosis, or anything of that kind used to influence the patient. Thus the cylinder must have done the work. I heartily agree with Dr. Bulson in his idea of refracting these cases even if they are small and if there is only a slight error. Dr. Jennings spoke of an important point and made a good hit I think in regard to the position of school children; they are prone in their first years in school to bend over too closely at their work or to bring their work too close to their eyes.

DR. FRYER.—I was very much interested in Dr. Bulson's paper. I am quite convinced that he is in the main correct, probably altogether correct. I am sure it is absolutely necessary to correct every degree of astigmatism when the cylinder has to be placed against the rule. There should be no question about that. Very often, as Dr. Bulson says, we can use some judgment in the lower degrees of astigmatism when with

the rule. But I believe we should evon correct lower degrees with the rule oftener than not; but we should always correct fully all astigmatism against the rule.

DR. BULLARD.—It has been my experience that the patients that have been most grateful for relief from eye-strain, have, in many instances, been those with a low degree of astigmatism. I make it a rule to correct all degrees of astigmatism even down to 0.25 D. when the patient can not be benefited in any other way. Some of these cases, too, have muscular errors and may be relieved by prism exercises. If I can not eliminate their troubles in any other way I invariably correct low degrees of astigmatism. In order to paralyze the accommodation I have been in the habit of using discs containing gr. $^1/_{50}$ of homatropine, with gr. $^1/_{50}$ of cocaine. I have found that in children this is sometimes not sufficient. Somehow my experience with homatropine has not been very satisfactory. I usually put in one of these discs in each eye and repeat it in fifteen or twenty minutes, and at the end of one hour from the application I make the examination. Sometimes I do not succeed. But at any rate I believe a great deal of benefit is derived from the correction of these low errors.

DR. COLBURN.—Dr. Bulson has certainly presented a very interesting paper and one which interests all of us. In this connection I wish to mention a couple of cases of misfits in grinding which I have come across recently and which attracted my attention particularly inasmuch as the good name of one or two of my colleagues was brought into question in their correction. First, I saw a young lady with a pair of weak cylinders; she had been corrected by a member of this Society but the correction had proved a failure, even an absolute nuisance. I examined her refraction again carefully and found exactly as the Doctor had found. Then I began to wonder why the test lenses showed one result and the glasses another. I neutralized the glasses in a rough way and found that they were apparently correct; but in handling them before the light, getting the reflection of the window-frame across them, I found right in the centre of the glass, a little spot, which had not been ground. It was less than $^1/_{16}$ inch in diameter. The cylinder had been beautifully polished and everything seemed correct, and it was only by holding the glass in such a way that I got the reflection of the window-frame across the cylin-

der that I discovered the error in the grinding. In another case I had a similar experience. Here the apex of a sphere was not ground, but beautifully polished. I sent the glass back to the gentleman who ground it and asked him to inspect it. He failed to discover the error and I pointed it out to him. I have wondered if that does not occur in other cases where relief is not obtained. In another case, that of a school teacher, a correction for astigmatism of low degree had been given. It was carefully done, still she obtained no benefit from the correction. She could use her eyes comfortably, but invariably had an eye-strain headache at night, until she was obliged, for many days, to lose half a day from school. It then occurred to me that there might be some other cause than the error of refraction, and I found from her diagram of the school room, that she was occupying a position facing four large windows. She simply had retinal exhaustion and following this came the utter inability to carry out the remaining part of her school work. I have found that frequently since, in the case of ministers, school-teachers, clerks and bookkeepers working in a bad light, and I think that the trouble is not altogether in the error of refraction but in part due to ill-adapted light producing irritation.

DR. TIFFANY.—I think with the essayist, that as a rule, we should correct these low forms of astigmatism, but we should be very careful to make the correction as has been said by Dr. Jennings. Sometimes the patient comes to us with a minus glass where he has a hypermetropia or a hypermetropic astigmatism. As a rule, where there is a slight compound hypermetropic astigmatism, I correct the astigmatism but not the hypermetropia. The ciliary muscle is inclined to work and I allow it to perform its functions, and I find my patients do better by giving the eyes merely the cylinder. Dr. Fryer speaks of correcting astigmatism when it is in the opposite, when it is against the rule, but we must be sure it is against the rule. Mistakes can only be prevented by the use of a cycloplegic. Then, in other cases, you may have to use a mydriatic to reduce the spasm of accommodation, before you can find the proper glass. I have found, especially with students, that if you correct the error of refraction, even if it is slight, you put the eye at rest and it recuperates, and within a

few months or so, the student is able to lay aside the glasses and go about his work.

DR. REYNOLDS. — I want to indorse the essayist, but I want to call attention to this fact, which I believe needs more emphasis, that whenever I prescribe glasses for a patient I prescribe also what sort of a frame he shall wear. I do not prescribe cylindrical lenses in a pinch-nose attachment. I tell the patient what sort of a frame he shall use, and if he will not accept it, I wash my hands of the whole matter and I refuse to take further responsibility in his case; I would rather he would go to somebody else. I think this matter of insisting on a correctly adapted frame should receive more attention, then much better results would sometimes be obtained.

DR. FRYER.—I concur with what Dr. Reynolds has said, and I think it is absolutely as important as the selection of proper lenses; the glasses must be properly centered and each pair of glasses must be suited and adapted to the particular patient. This is particularly true where there is muscular trouble. You can not properly treat such cases unless you have suitable frames. I am like Dr. Reynolds; I insist on people wearing spectacles when they have astigmatism and it is equally essential that the spherical lenses should be properly centered, unless we order otherwise.

DR. CORR.—I wish to commend Dr. Bulson for presenting his paper for many reasons. The matter of refraction constitutes a large part of our work and anything that enables us to thoroughly understand it is of great importance. The question which the Doctor draws out in his paper is the prescribing of very low degree lenses for the correction of slight trouble. The answer to the question, in my opinion, depends on what is really the matter. If there are symptoms of asthenopia and even a very small error, that is what I prescribe for: but I have seen conditions where a perfect correction with ability to use the eyes would not stop the pain. In such cases, no matter what the correction may be, the patient may have gotten into a condition in which the use of the eyes for any purpose causes discomfort, and unless the eyes are rested for a long lapse of time, the cause of the trouble will continue. This matter was discussed before the Chicago Ophthalmological Society resulting in the view that in such eyes there is simply a painful condition of the muscles. I forgot the name that was

applied to this condition, but it grows out of the habit of the patient with the uncorrected error of refraction, and its correction will not always relieve the muscular pain. Now we all know that there are other cases which we can not relieve, except through the mind of the patient. They are of a kind with that of the woman who supposes she is troubled with falling of the womb, and who, after she has been told that she is relieved and a pessary has been put in, will go away satisfied, although no pessary has been inserted. So there is a class of cases of painful eyes which will yield to suggestion only. As to the relative value of atropine and homatropine, I can not quite understand how I could transact my business simply with the use of atropia. Homatropine, to my mind, is a boon in refractive work, because we can get through a case in a day.

DR. TIFFANY.—I wish to remark that a very celebrated optician—a wholesale and retail man in Chicago, who has an immense practice in filling prescriptions from oculists, says that four-fifths of the trouble that he has, comes from the oculists; the opticians have less trouble with the glasses they prescribe than the oculists.

DR. REYNOLDS.—Who are the oculists?

DR. TIFFANY.—The oculists are the prominent men of Chicago and all over the country; and this optician says they are the persons who make the trouble.

I wish to say this, that if you do not want a complete cycloplegia, homatropine will do; if you want to correct fully, you should not trust to homatropine; if you want to reveal the true amount of error, homatropine will not serve, you must use sulphate of atropia. Homatropine will dilate the pupil fully, but it will not produce complete cycloplegia. If you only want to correct a part of the astigmatism or hypermetropia, you can use homatropine.

DR. REYNOLDS.—I simply wish to protest against the use of the term oculist as applied to the medical practitioners who practice ophthalmology and the allied branches. I do not know an institution in the United States that turns out oculists. We are doctors of medicine, and I always take pains to impress upon people that I am a medical practitioner—a doctor of medicine.

DR. BARCK.—I should like to hear the President's views on this question.

DR. ALT.—I have very little to say on this subject. As I grow older I try more and more to give my patients as much comfort as possible,to enable them to work as much as possible and trying to reach this I find that it will but rarely do to give a full correction of the ametropia which is present. For instance, if in a case atropine, which I use—as I have discarded homatropine after a thorough trial continued over two years—shows me that there is a hypermetropia of 3 dioptries and the patient is only comfortable when he wears a glass of 1 dioptry, I order 1 dioptry. This practice, has grown out of what is now quite a number of years of experience. There was a time when I was younger, when I corrected the whole ametropia and forced the patients to use the glasses indicated. In those days I would tell my patient peremptorily to wear those glasses, and if a patient came back to tell me he could not wear the glasses I had prescribed, I would tell him, you must wear those glasses, and if you will not do as I direct, you may go where you please. I have learned better and I try to fit my patient as near as possible to his degree of ametropia and yet try to make him comfortable. Sometimes a full correction can be worn, but if the patient can not do so, I try a weaker glass which he may wear with comfort. There is frequently a discrepancy between the faculty of accommodation and the degree of ametropia which does not allow of a full correction and will only change gradually under the use of glasses which slowly rise in strength. In regard to the correction of small degrees of error I am guided by the same principle. If the patient has 0.5 D. of astigmatism or hypermetropia and is decidedly benefited by wearing such glasses I will most assuredly give them to him, but I would not insist upon a patient wearing a glass of that strength or weakness all the time on his nose when he has no use for it I try to do the best I know for each individual case, never forgetting that I have to deal with a living eye and not with an optical instrument.

DR. COLBURN.—It seems to me also that the whole question resolves itself into this, that we must treat each individual patient according to his symptoms and condition. As regards the selection of a frame, it is sometimes difficult to get a proper adjustment. For many years I have made it a prac-

tice to have my assistant fit a frame to the patient's face; I have a large box of frames of various styles, and he takes a pair of plyers and fits a frame to the patient's face. Then this frame is sent to the manufacturer and a duplicate is made and the original is returned to me. I also attend myself to the placing of the glasses on the patient and see that they are made according to the prescription.

DR. BULSON.—I feel highly complimented that this paper has drawn out such an extensive discussion. I am willing to admit that it is an old subject, but from the discussion I think we can learn something yet. I thought I brought out in the paper the fact that every case is a law unto itself, I at least intended to bring it out. Yet we know that we find cases in which there is a moderate error of refraction and the question is, whether the disturbance is sufficient to warrant correction. My object in presenting this paper was to bring out a discussion on the point as to whether it was advisable to prescribe these weak lenses. This was suggested to me by a remark that was made in one of the ophthalmological societies by a noted ophthalmologist who stated that a lens below 1 diopter had a mythical value and that he would not prescribe it and never had, and that he considered any ophthalmologist foolish who did so. To this I say, I am willing to be accused of foolishness in prescribing lenses under 1 diopter. I do not pretend to say that in every case in which the total hypermetropia or the total astigmatism is but 0.25 or 0.5 D. it should be corrected. Not by any means. The temperament and surroundings of the patient, the health of the patient will determine what correction should be given. This work makes up nearly fifty per cent. of the work of most ophthalmologists, and the man who does not pay attention to errors of refraction and give to them his scientific consideration the same as he would to a case of cataract, glaucoma or corneal ulcer falls short of doing his duty. When such patients come to me I first determine the amount of manifest error, and after that, if the patient is young—and young people are the ones most apt to have this trouble, I use homatropine. I prefer the discs manufactured by Wyeth & Co. I place one of these into each eye every ten minutes and blindfold the patient. This is done by an assistant and who also records the exact time. At the end of the time I take the bandage off, wash off the accumulation

of gelatine and at the end of fifteen or twenty minutes begin the examination and I very rarely have a case which does not give up the total amount of the error. I have tested this repeatedly with atropine following the homatropine and have found no more error than shown by the homatropine. I agree fully with Dr. Alt in regard to the old rule. I do not believe in correcting the full amount always. I have in mind particularly a patient who came from as good a man as Dr. Noyes. She had an immense amount of discomfort and headache when she attempted to read at all, and she did not think anything could be done for her since she had been to the specialists in New York and other places and received no relief. I asked her whom she had consulted and she named Dr. Noyes, and I said if Dr. Noyes can not help you I am afraid I can not do it either. She told me, he said: these are the glasses which are suitable for your case; but she said she could not wear them, they would drive her crazy. I examined the glass, it was + 3.5 D. s. I put her on the chair and examined her vision and found it $^{20}/_{XX}$ and the highest glass she would accept was 0.5 D., in other words, that was her manifest hypermetropia. Under the influence of a mydriatic I found the amount of error was just equal to what Dr. Noyes had given the glass for. So that Dr. Noyes had given the right glass, but she could not use it and I gave her a 1 diopter glass and told her to wear that until she found symptoms of discomfort present, and when she found that to come back. She stated to me that it was perfect, that she never had seen with such comfort in her life. She did not have a particle of discomfort for three months; she read and sewed. At the end of that time she told me that she could not read with the same degree of comfort that she had before. I substituted a + 2 D. and when last I heard from her she was wearing that lens comfortably notwithstanding her hypermetropia is a great deal more than that. So I think we must in this way use a certain amount of discretion. I will say this, that in these cases of a small amount of error of refraction we do often find a good deal of trouble, especially in students. We find many students in the university with moderate errors of refraction which create oftentimes a disproportionate amount of disturbance. My attention was first called to this matter in my own case. I have a hypermetropic astigmatism of 0.25 D. I was suffering in my

student days with intense headaches and consulted an ophthalmologist; he examined me under atropine and found As 0.25 D., but he thought it was useless to correct. I told him I had headache; he said, I hardly think that is produced by this refraction, but he corrected it, and I have worn the glasses ever since with comfort and it is not imagination with me either. If I go without my glasses an entire evening, the next morning I have an intense headache—that is, if I do two or three hours' steady work. I can not get along without this glass.

A CASE OF OCULO-MOTOR PARALYSIS WITH SCOTOMA OF VISUAL FIELD.[1]

BY GEO E. BELLOWS, A.M., M.D., KANSAS CITY, MO.,

OCULIST TO ST. MARGARET'S HOSPITAL AND THE U. P. RY. CO.; CLINICAL ASSISTANT IN OPHTHALMOLOGY AT THE UNIVERSITY MEDICAL COLLEGE.

THE patient, G. S., aged 36 years, male, colored, single, a brick maker by trade, was first seen at the clinic at the University Medical College, January 30, 1897. About three months previously he first noticed that the right lid began to droop and that he saw double, and was dizzy when both eyes were open. The drooping of the lid increased until the pupil was entirely covered and has remained so since.

The patient is a muscular, well-developed man in good general health. The family history is good, or at least negative. No history of tuberculosis or cancer. He has had syphilis, the initial lesion occurring about sixteen years ago. No other tertiary lesions are known to have developed. About two years ago he had purulent dacryocystitis on both sides, resulting in fistulæ. The left one subsequently closed, but the right one still remains patent, but minute, and pus can still be squeezed from it.

General health good at present. No evidence of tabes dorsalis or other disease of the spinal cord—reflexes all nor-

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[1] Read at the Second Annual Meeting of the Western Ophthalmological, Otological, Laryngological and Rhinological Association, held in St. Louis, April 8–9, 1897.

mal and the patient stands readily with eyes closed. There are no paralyses aside from those of the ocular muscles, and no abnormalities of sensation. Urine normal in amount, sp. gr. 1022, and contains neither albumen nor sugar.

When first seen at the clinic the following condition was present: Complete ptosis of the right lid, with ability to raise it only slightly by the aid of the right frontalis,—not at all when the frontalis was fixed by pressure on the supra-orbital ridge. On raising the lid the eye was found to be considerably abducted, and could not be moved in any direction except outwards and slightly downwards. The pupil was moderately dilated and not responsive either to light or accommodation. Examination showed binocular diplopia, crossed, the false image slightly higher, and with its upper end inclined to the right.

There was a positive scotoma in the temporal field of the right eye, amounting almost to hemianopsia. The blind area, approximately semi-circular in outline, approached to within about 10 degrees of the point of fixation on the horizontal meridian. Over most of this area objects could be perceived, but only indistinctly. The hand could be seen but fingers could not be counted. L. V.$=^{20}/_{xx}$; J. No. 1, 8″—20″. R. V. $=^{20}/_{xxx}$, not improved by glasses. The inability to improve vision by glasses indicated that the impairment of vision was due to a diminished conduction in the macular fibres, and not to an error of refraction made manifest by the paralysis of accommodation. Tension was normal, no tenderness on pressure. Conjunctiva uninjected. Cornea and all refracting media clear and fundus normal, except, possibly, a slight haziness of the disc.

We have then to determine—first, the character of the paralysis, *i. e.*, what muscles are involved; second, the locatiod of the lesion causing the paralysis; third, if possible, the nature of the lesion.

Fuchs says: "The diagnosis as to which muscle is paralyzed often presents considerable difficulties even to the adept, if the case is complicated. This occurs when several paralyses are combined." In this case, however, it is not difficult to determine what muscles are affected.

The ptosis, the position of the eye, its loss of motion in all directions except outwards and downwards, the position of

the false image, the dilatation of the pupil and loss of accommodation, show a paralysis of the levator palpebræ superioris and all the internal and external muscles of the eye except the superior oblique and external rectus, *i. e.*, complete oculo-motor paralysis of the right eye.

The location of the lesion is scarcely more difficult to determine. Paralysis of the ocular muscles may be classified, as regards the seat of the lesion, as follows:

1. Peripheral. (*a*) Intra-ocular; (*b*) Orbital; (*c*) Basal; (*d*) Fasicular (root paralysis).
2. Intermediate (nuclear).
3. Central (cortical).

In this case an intra-ocular lesion is of course excluded, since extra-ocular muscles are involved. There was no indication of orbital trouble,—no tenderness on pressure, no exophthalmos, no inflammation, and the eye was freely movable in the direction of the unparalyzed muscles. A fasicular lesion involving the entire oculo-motor root would almost of necessity cause other motor or sensory disturbances.

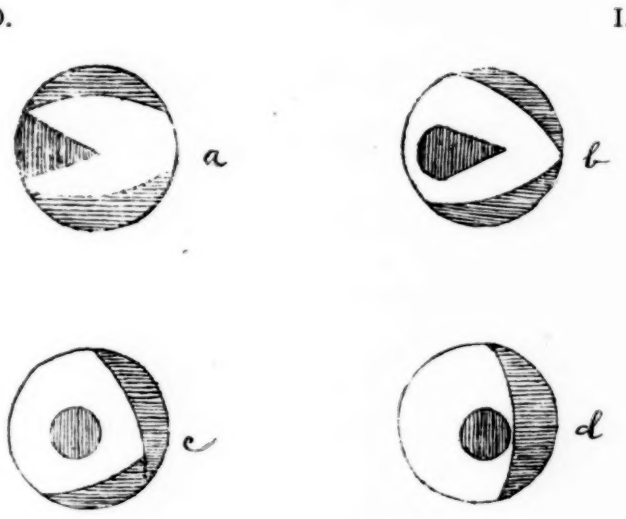
Complete oculo-motor paralysis might possibly be due to a nuclear lesion, though hardly without some involvement of the other eye, especially when the onset is sudden. No cortical centers are known for any individual ocular muscles except the levator palpebræ. Moreover cortical lesions cause disturbances of associated movements rather than paralysis of separate muscles.

But the scotoma in the visual field is a very positive localizing indication. A lesion causing monocular scotoma *must* be anterior to the chiasm, and if the scotoma and the paralysis in this case are both due to the same lesion, it must be one located at the base of the brain between the chiasm and the apex of the orbit.

One point of special interest should be mentioned here,—the bearing of this case on the arrangement of the fibres in the optic nerve. According to Siemerling and a majority of investigators, the uncrossed fibres going to the *temporal* half of the retina, lie at the temporal side of the optic nerve. Schmidt-Rimpler, however, in a case of cortical hemianopsia with secondary optic atrophy, found the crossed fibres from the *nasal* half of the retina at the temporal side of the nerve in the re-

gion of the optic foramen. The arrangement of fibres as given by him is shown in the accompanying illustration.

As the motor oculi at the base of the brain lies to the outer side of the optic nerve, any lesion involving both would necessarily affect the temporal side of the optic,—a condition which exists in this case. But as the scotoma was in the temporal field of vision, the nasal half of the retina must have been affected. This would agree completely with Schmidt-Rimpler's arrangement.



Transverse section of right optic nerve seen from the front. O, temporal side; I., nasal side. *a*, region of lamina crelerosa; *d*, in optic foramen Macular fibres shaded vertically, uncrossed, horizontally. From Knies—Eye in General Disease.

The exact nature of the lesion can not perhaps be stated so positively. However, there was no indication of meningitis hæmorrhage, or aneurism, and no reason to suspect tubercle. The specific history makes us, of course, suspect some syphilitic lesion, and of these gumma is the most probable. Moreover, our diagnosis in this cases is aided by the fact that active anti sphilitic treatment has resulted in a steady improvement in all symptoms.

February 20, 1897, three weeks after beginning treatment, the scotoma had nearly disappeared, and there was some mo-

tion of the eyeball in all directions. The lid could be raised above the pupil, but the patient still kept his eye closed on account of the diplopia.

March 28. The visual field is perfectly normal. R. V.= $^{20}/_{XX}$, J. No. 1, 8″—20″. Motion inwards and upwards is still somewhat impaired, and there is diplopia on looking up and to the left, but the patient keeps both eyes open and says he can see as well as ever.

The diagnosis then would be—complete oculo-motor paralysis of the right eye with scotoma of the temporal field, due to pressure on the optic and motor-oculi nerves, between the chiasm and the apex of the orbit, probably from a syphilitic gumma.

DISCUSSION.

DR. COLBURN.—I have been interested in the Doctor's paper, it is especially interesting to me, because I have seen a case similar in some respects. About a year ago Prof. Lederer referred a gentleman to me,—a personal friend in whom he was greatly interested, and I found that the Doctor was greatly concerned, fearing that the patient had tubercular disease of the brain, as he had been having a slight increase of temperature and there was a previous history of an apparent cure of tuberculosis of the lungs. The gentleman had regained apparently perfect robust health. Then an elevated temperature showed itself combined with some mental disturbance and excessive nervousness, and this made the Doctor very anxious, fearing the patient had tubercular disease of the brain. About this time the patient began to have paralysis of the muscles of the right eye,—I can not give the order in which it came,—but it went from the abductor to the other muscles, and was followed by ptosis. Then the left eye became involved and he had a systematic rotation of paralysis beginning with the third and going on until one after the other, nearly all the muscles were involved. Now the Doctor was suspicious that there was tuberculosis. My impression was that we had a septic condition to deal with. I began to study the patient with reference to this. In examining the crypts of the tonsils I brought out membranes or brought out substances that Dr. Lederer examined under the microscope and pronounced staphylococcus accumulations in large mass. We

then removed portions of the tonsils, examined the removed portions, and found large cavities from which the infection was taking place. After the removal of the tonsils the temperature became normal, the patient gradually became better and the paralysis of the various muscles improved very rapidly. He had been under all sorts of anti-phlogistic treatment without any good result. Everything that could have been anticipated was done in the case, but until the tonsil was thoroughly cleared out there was no improvement.

DR. STILLSON.—There is one point the Doctor did not mention, and that is, that the recovery of these cases of ocular paralysis is spontaneous in some cases, as in locomotor ataxia. In locomotor ataxia these symptoms of paralysis will come on one after another; there may at first be paralysis of the third nerve, by and by the pupil will become involved, there may be paralysis of accommodation or perhaps ptosis, and then the locomotor ataxia symptoms appear further down. The eye symptoms appear early, diplopia appears and then passes away; then the paralysis of the muscle of accommodation may get better and then again get worse. There may also be reflex throat troubles, spasmodic closure of the glottis, which will get bad, then get better and possibly pass away entirely. So we are sometimes liable to deceive ourselves when we attribute a cure of the ocular paralysis to a removal of adenoids or tonsils or what nots, and I think it wise for us to bear these things in mind, particularly when we have a paralysis occurring in locomotor ataxia or in cases due to rheumatism or gout.

DR. BARCK.—The most interesting points in the paper are the two points just mentioned. But I can not concur with the conclusions drawn by the author. I can not agree, that from the presence and location of the scotoma we can arrive absolutely at the conclusion that the seat of the trouble must be located in front of the chiasm. I believe we should state exactly what we know and what we do not know; and I believe that we all will be willing to admit that we can not tell how the fibres are running which cause the trouble. You are all aware of the fact, I suppose, that the idea which so long obtained of a semi-decussation of the fibres of the optic nerve in the chiasm is now questioned considerably. Within the last few years it has been maintained by several observers at least, that instead of a semi-decussation there is a total decussation

taking place in the chiasm. So I think we had better content ourselves with stating what we do and do not know, and at present we do not know anything positive about the course of the fibres of the optic nerve at any distance or immediately behind the eyeball itself.

DR. FRYER.—I wish to say a word of commendation of the Doctor's paper. And the important point seems to me in calling attention to the location of the lesion. I believe and the majority of oculists will, notwithstanding these latter claims of gentlemen whom Dr. Barck alludes to, that experimentations heretofore have proved a decussation. Dr. Bellows speaks of the rarety of these lesions of one nucleus. This is true, but occasionally we find a lesion on autopsy located in a single nucleus.

DR. BELLOWS.—I have just one remark to make in closing in regard to the semi- or total decussation. As Dr. Barck says, the general view heretofore held, has been that of semi-decussation; but that this view has been changed of late. I believe in semi-decussation. There is one case reported by Dr. S. Weir Mitchell af bi-nasal hemianopsia in which on autopsy it was found that an aneurism totally divided the chiasm from before backwarks. Now if this case is correctly reported there must have been a semi-decussation otherwise the total division must have produced total blindness.

ASTIGMATISM.[1]

BY DUDLEY S. REYNOLDS, A.M., M.D., LOUISVILLE, KY.,

PROFESSOR OF OPHTHALMOLOGY, OTOLOGY AND MEDICAL JURISPRUDENCE IN THE HOSPITAL COLLEGE OF MEDICINE, MEDICAL DEPARTMENT OF THE CENTRAL UNIVERSITY OF KENTUCKY; SURGEON TO THE EYE AND EAR DEPARTMENT OF THE LOUISVILLE CITY HOSPITAL, AND THE GRAY STREET INFIRMARY.

THIS report is based upon the recorded observations of four thousand six hundred and eighty-four (4,686) persons, excluding, as far as possible, all cases of presbyopia.

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[1]Read at the Second Annual Meeting of the Western Ophthalmological, Otological, Laryngological and Rhinological Association, held in St. Louis, April 8–9, 1897.

I rely absolutely upon the stenopaic disc, and the test type of Snellen, illuminated always with parallel light, with the patient's accommodation completely suspended. This is the only method which I consider worthy of the confidence of either the patient or the practitioner.

Total number of cases		4,686
Total number of cases of spherical error requiring correction	3,450	
Number of cases with H. in one eye and M. in the other	168	
		3,282
Astigmatism H. in both eyes	380	
Astigmatism H. Comp. in both eyes	254	
Astigmatism H. one eye only	232	
Astigmatism H. Comp. one eye only	185	
Mixed astigmatism in both eyes	54	
Mixed astigmatism in one eye only	37	
Astigmatism M. in both eyes	76	
Astigmatism M. Comp. in both eyes	89	
Astigmatism M. in one eye only	44	
Astigmatism M. Comp. in one eye only	57	
	1,408	
Persons with H. astigmatism in one eye and M. astigmatism in the other eye	4	
		1,404
Astigmatism of oblique axis	206	
Astigmatism of different degree in each eye	154	
Astigmatism at right angles in both eyes	167	
Astigmatism in one eye only	555	
Astigmatism of same degree and axis, both eyes	322	
	1,404	

It may be interesting to observe that the mydriatic used in the first 576 cases, in which there were 113 cases of astigmatism, was sulphate of atropine. In the remaining 4,110 cases, in which there were 1,291 cases of astigmatism, the

mydriatic used was the hydrobromate of homatropine. The manner of employing the latter has been varied; at first I used one grain to two drachms of distilled water, dropping the solution into the eyes every fifteen minutes until four applications had been made. This method proving unsatisfactory, I doubled the strength of the solution, and employed it every five minutes until four applications had been made. In a large number of experimental observations to determine just when the accommodation is suspended under this method of using the mydriatic, I concluded thirty-five minutes to be the minimum, and fifty minutes to be the maximum time required to produce complete suspension of accommodation.

In the last 2,000 cases, I have employed ten instillations of the homatropine solution, in the strength of one grain to the drachm of water, the instillations being one minute apart. I find that complete suspension of accommodation is almost invariably present forty-five minutes after the last instillation, and that the effects have begun to fade away at the end of an hour and a half. I have occasionally found it necessary to repeat the instillations, causing the patient to remain another half hour, after the last, and, in the repetition of the instillation, I deem four applications quite sufficient. I have never known a case, even in high grades of astigmatism, which would not finally succumb to the action of homatropine. I have, in twenty or thirty cases, found a third repetition of the instillation of the homatropine necessary.

DISCUSSION.

DR. JENNINGS.—I wish to make a few remarks as to the different mydriatics. I have tried all of them. Lately I have been using scopolamine very largely, but I have finally drifted back to homatropine because I could not see that it had any particular benefit. I could not discover any marked error of refraction which would be brought out by scopolamine and not by homatropine. It has the same disadvantage as atropine; the patient is not able to do his accustomed work for at least three days, and sometimes four or five, and when the mydriatic has about half lost its effect the patient naturally tries to use his eyes and naturally more or less eye-strain will result, and you will thus keep up a condition which you have in the be-

ginning tried to get rid of. There is, however, one point that I would urge strongly, and that is the proper application of homatropine. The lower lid should not be drawn down and a drop of homatropine put into the conjunctival sac, but while the patient looks down a drop should be put on the upper edge of the cornea. As the eye rolls up this is evenly distributed over the whole surface of the cornea. If it is merely put into the conjunctival sac sometimes we do not get a perfect paralysis of the accommodation.

DR. CORR.—I am glad that the Doctor has read this paper as it brings up the subject which was discussed before the Ophthalmological Section of the American Medical Association at Baltimore. Some gentleman gave some such table as this, but not so complete. I am particularly struck with this point, that in my practice I have found the per cent. of mixed astigmatism to be about two. Dr. Würdemann, I think, reports about the same per cent. Some of the gentlemen who discussed that paper gave a great deal larger per cent. I have always acted on this principle, that static refraction can be responsible for astigmatism in but one meridian. If there is an astigmatism of another meridian it must be due to dynamic refraction. Now if we can wholly set aside the dynamic refraction by means of mydriatics, we ought to do away with astigmatism due to that, and if so, we ought to be able to resolve everything into a simple astigmatism from a compound one. I have acted on that principle and have resolved quite a good many of the cases that appeared by superficial examination to be cases of mixed astigmatism, but I have not succeeded in reducing all. I think if I had continued the experiments I would be able to still further reduce them. You can not have an astigmatism in a static refraction except in one meridian.

DR. DRIVER.—I would like to inquire what part of the hypermetropia is corrected in his compound hypermetropic case; if the Doctor makes a complete correction or only a partial one.

DR. ?.—The paper is certainly a very valuable one, and it has required a large amount of work in preparing it; the Doctor is to be congratulated on his work. I can not quite agree with the Doctor as to the effect of homatropine. I have not been able to get the effect even where I have used a dou-

ble dose. I used Merk's, but could not get a complete cycloplegic effect, and I used the instillations every five minutes for an hour. I can scarcely agree with Dr. Jennings in his statement about scopolamine. By the careful use of the drug I have had, with the ordinary dose, the same effects as I would with atropine, but I certainly differ in regard to the effect of homatropine. It would be a very good thing if we could always rely upon it, but I am certain that in young people we can not.

DR. DRIVER.—I wish to say that I agree with the Doctor. In young people I have found nothing so satisfactory as the sulphate of atropine. I have tried the other drugs, and although I have not had a very large number of cases, I can say that we do not get the paralysis that we have a right to expect, and therefore I have discarded it and now rely wholly upon the atropine, notwithstanding its disagreeable effects for four or five days. I consider it the most efficacious and most reliable.

DR. REYNOLDS.—I am very much obliged to you gentlemen for the discussion, and I will try to answer the objections and criticisms that have been made, and I will go backwards in reply. In regard to homatropine, of course I do not know how you gentlemen use it, nor what particular dose you apply, nor how you determine the presence of complete cycloplegia. I began to record my observations late in my professional life. I am sorry I did not commence to record them sooner. I found, however, that it would not do to use with my patients sulphate of atropine and keep them away from business for from eight to ten days. Then atropine frequently produced toxic symptoms which made it necessary to discontinue its use. So that when homatropine was introduced I hailed it with delight and seized upon it at once, and the experimentations which I carried on at a large clinic at the City Hospital, and in my private practice—of all of which work I kept records—enabled me to satisfy myself of the usefulness of this drug. But the solution must be made fresh every day. I find it deteriorates rapidly not in its capacity to dilate the pupil, but to produce suspension of accommodation I do not wait forty or forty-five minutes after the instillation, but only thirty minutes. Sometimes I have the instillation made a third time, but the accommodation usually succumbs to one or two instillations of

homatropine and inasmuch as it produces no unpleasant symptoms I value it very highly. I have no respect for solutions that are found on the market.

Now as to the value of the Javal-Schioetz instrument. Dr. Edward Jackson, of Philadelphia, maintains that in 16 per cent. of the cases the total astigmatism is revealed by the ophthalmometer in its most improved form. It is a time-saving machine—it measures with approximate accuracy the different curvatures of the cornea, but the different curvatures of the cornea have very little relation to total astigmatism of the eye and since it is for the purpose of correcting the total refraction we must not busy ourselves with those nice little attempts at measuring the curves of the surface of one of the reflecting areas, but take the whole thing. Now 16 per cent. is a very small amount of success. I have hypermetropic astigmatism myself of $^1/_{12}$, and yet for a long time under the action of the sulphate of atropine I went under the impression that I had only $^1/_{20}$. Now $^1/_{12}$ is about $3^1/_2$ diopters and $^1/_{20}$ is about 2 diopters, that is the difference. With atropine I did not have a complete suspension of accommodation, but the glasses were such a vast improvement upon nothing that I toiled on, and I have not required a spherical lens at all. I really supposed that I required $^1/_{12}$ to correct my astigmatism until I made the test with homatropine. Now another point, it is not necessary to correct this wholly, nor is it necessary to use glasses all the time. The skiascope test is exceedingly nice; it is scientific, and approximately accurate results are obtained by those who have time to work with it. But homatropine is better. Just as I said in my own case, before the use of homatropine I was under the impression I had only $^1/_{20}$, and under a complete suspension of accommodation it turned out that my astigmatism is plus $^1/_{12}$ and I use a minus glass when I go on the street. I am 54 years of age, still I can not go out on the street and see distant objects with a $+ ^1/_{12}$ glass, but I wear just half that amount, $- ^1/_{24}$. I know this is opposed to the teaching and dictum of our masters in the profession.

DR. TIFFANY.—Do I understand you to use minus glasses for distant objects?

DR. REYNOLDS.—I am looking at you through a minus $^1/_{24}$.

DR. TIFFANY.—Without a plus glass.

DR. REYNOLDS.—No plus glass at all.

DR. TIFFANY.—It seems to me that it is probably more of a mixed astigmatism; that is that he now has presbyopia and so does not need a concave glass for near objects.

DR. REYNOLDS.—I have no presbyopia. I would like to have you examine me.

DR. TIFFANY.—I would like to ask Dr. Reynolds if he treats his patients in the same manner? If, when he finds a plus astigmatism, he gives a minus glass?

DR. REYNOLDS.—If it is of high grade I do, yes.

DR. DRIVER.—I would like to ask the Doctor this question: Say we have a case of compound hypermetropic astigmatism, does he correct the hypermetropia with the astigmatism? Say you have + 2.0 D. with + 1 D. cylindrical, do you correct it for distance and for reading?

DR. REYNOLDS.—Such cases do not generally require glasses for distance. People of course vary in that respect, some of them will require correction for the street. I recall now a case of a man who wears a plus lens for distance and has ordinarily no use for a cylindrical lens, but when he reads he requires a full compound lens.,

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ARGENTAMIN IN OPHTHALMICS.

Hoor has recommended argentamin as a substitute for silver nitrate in eye affections where the latter is indicated. Argentamin is chemically ethylenediamin-silver-phosphate. Unlike silver nitrate, which when crystalline, is acid in reaction, and when fused neutral in reaction, argentamin is alkaline, and this accounts for the fact that its application causes only slight and transient local reaction, a point much in its favor. It never gives rise to a deposit on the abraded or ulcerated cornea, which nitrate of silver sometimes does, nor to staining of the conjunctiva, nor to the disagreeable metallic taste associated with the use of the latter. It may be used in 3 or 5 per cent. watery solution, once or twice a day, or oftener if required. It seems to have all the advantages and none of the disadvantages of silver nitrate.—*British Medical Journal.*

CLINICAL MEMORANDA.

OCCURRING IN THE PRACTICE OF DRS. ALLPORT AND TODD.

BY FRANK C. TODD, M.D., MINNEAPOLIS, MINN.

A CASE ILLUSTRATING THE EFFICACY OF SUB-CONJUNCTIVAL INJECTIONS.

MRS. S., age, 50 years, a woman of vigorous healthi was struck in the eye with the edge of a newspaper. The cornea became clouded and within thirty-six hours a corneal ulcer developed. The patient used hot applications for a few days, but the symptoms becoming more pronounced, she called her family physician, who diagnosed kerato-iritis, and prescribed in addition to the hot applications, a solution cantaining atropine, cocaine, and boracic acid. Mercury and potassium iodide were given internally. She was kept in a dark room and her bowels and diet regulated.

Her eye becoming worse, Dr. Allport was called, and found the patient suffering agonizing pain, uncontrolled by morphine and other anodynes, and afflicted with insomnia, anorexia and intense nervous demoralization. There was ulcerative and diffuse keratitis, iritis with posterior adhesions, beginning hypopyon, contracted pupil, circum-corneal injection and cyclitis. Beneath the epithelium of the cornea there was an extravasation of blood giving the appearance of a bulla. Her stomach would no longer tolerate mercury and potassium iodide, and they with the hot applications were discontinued. Ten grains of sulphonal, to be taken at night, was prescribed. Three ounces of blood was extracted from the temple, a strong atropine solution was instilled, one-half a drachm of a freshly sterilized one per cent. solution of sodium chloride was in-

jected sub-conjunctivally, the eye bandaged and the patient told to keep quiet in a dark room. She returned next day a new woman, having slept all night absolutely free from pain, and was in good spirits.

The incipient hypopyon had disappeared, likewise the iritic adhesions, and the pupil was dilated. In every way the eye appeared much better. The same treatment was, in the main, sustained until the end, the temple being cupped once more at intervals of three days, and two more sub-conjunctival injections used. The patient suffered no more pain, and uninterrupted recovery followed.

The chief credit for the pronounced improvement must be given to the sub-conjunctival injections.

A CASE IN WHICH SUB-CONJUNCTIVAL INJECTIONS WERE NOT EFFICIENT.

MR. H. N., age, 18 years. Caught cold in left eye, and developed iritis. His family physician dilated the pupil with atropine and prescribed hot applications, which was followed by improvement until the patient, desiring to save expense, ceased the atropine, when tough adhesions formed and inflammation increased. When he presented himself for treatment the cornea was ulcerated and hazy, the iris inflamed and the pupil occluded. No dilatation could be obtained. Three ounces of blood was extracted from the temple at intervals of three days on three occasions, mercurial inunctions and potassium iodide prescribed, the patient kept in a dark room, one-half a drachm of a one per cent. solution of sodium chloride was injected sub-conjunctivally, and repeated in three days. As only transitory improvement followed, five drops of a $^1/_{2000}$ solution of mercury bichloride was substituted for the salt solution, and repeated several times on subsequent days. Paracentesis was performed four times decreasing tension, and relieving pain each time. Iridectomy was advised, but the boy was unwilling and his parents too far away to give consent. As nothing seemed to be curative, the atropine only aggravating the inflamed iris, and the injections not beneficial, all treatment excepting the potassium iodide and mercury was

discontinued. Inflammation gradually subsided, leaving an occluded pupil and leucomatous cornea.

A CASE OF NOCTURNAL EPILEPTIFORM CONVULSIONS RELIEVED BY CONTROLLING A SPASM OF ACCOMMODATION.

PATIENT, J. D., age, 10 years. Referred by City Physician. Diagnosis: Epilepsy. Symptoms: Frontal headache and dizziness. The convulsions were nocturnal, and had occurred nearly every night for two weeks, coming on after the patient had fallen asleep. The attacks were ushered in by extreme restlessness and unconsciousness. Violent muscular contractions, frothing at the mouth, and other epileptic symptoms followed. Patient was anæmic and lethargic, though previous to this trouble he had enjoyed good health. Examination without cycloplegic. V. = $^{10}/_{CC}$–$^{20}/_{XL}$ w. — 1.50 s., both eyes. After daily atropine instillations for one week examination revealed V.=$^{20}/_{LXX}$–$^{20}/_{XXX}$ w. — 1.25 s.⌒+0.50 cyl. ax. 90°.

This latter correction was prescribed and atropine used for a month. After the first use of atropine the patient was relieved of all his symptoms, slept well and had no more convulsions. A relapse may occur, but such is not probable, for it seems evident that the convulsions were due to eye strain.

A PIECE OF STEEL IN THE VITREOUS LOCATED BY OPHTHALMOSCOPY AND REMOVED WITH THE ELECTRO-MAGNET.

PATIENT, T. D., age, 21 years. Consulted Dr. Allport January 14, 1897. One hour previous, while rimming a screw-hole with a chisel, a piece of the chisel had chipped off and darted into the patient's eye.

Inspection showed a rupture of the ocular conjunctiva and sclera, one centimeter external to the margin, and just inferior to the longitudinal axis of the cornea. Ophthalmoscopic examination revealed a clear aqueous and lens, a somewhat hazy

vitreous, numerous ruptures of the choroid near the point of entrance of the foreign body, and a rupture on the nasal side of the disc. Just inferior to the immediate rupture a glistening body could be seen, and this location was carefully noted.

The operation took place at the hospital within a half hour. Under cocaine anæsthesia, the point of a electro-magnet was introduced through the rupture in the globe, and directed toward the location already determined. That the foreign body had been correctly located, was proved by the click heard as soon as the point was introduced and it only remained to withdraw the magnet to which the piece of steel adhered, and insert one suture to complete the operation. There was no escape of vitreous, and the wound quickly healed. The patient was kept on his back for two weeks, and most of the time for a month.

There is now an extensive retinal detachment, but the nasal fundus is still capable of receiving impressions. The piece of steel is wedge-shaped, has jagged edges, and measured one-quarter of an inch in diameter.

THE RŒNTGEN RAY.—Dr. E. Bock, in *Memorabilien* for February, suggests that if letters are painted on a sheet of card-board, afterwards varnished and dusted with powdered metal, or the letters are made as gold leaf is applied, the Rœntgen rays will throw their shadow through the opaque cornea of the blind, and if the optic nerve is still sound, the blind person will see the shadowgraph thrown on the retina. He urges experts to experiment in this line with persons who have lost their sight from opacity of the cornea, etc., and quotes Prof. Eder, of Vienna, as authority for its feasibility.—*Journal of the American Medical Association.*